

Link 1. Dynamic Linking Overview

Young W. Lim

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1 Linking

- Based on
- Dynamic Linking Examples
- Relocatable Object Files (main.o)
- PIC Relocatable Object Files (swap.o)
- Shared Object Library File (libswap.so.1.0.1)
- Executable Object Files (p2)

"Self-service Linux: Mastering the Art of Problem Determination",

Mark Wilding

"Computer Architecture: A Programmer's Perspective",

Bryant & O'Hallaron

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Compiling 32-bit program on 64-bit gcc

- `gcc -v`
- `gcc -m32 t.c`
- `sudo apt-get install gcc-multilib`
- `sudo apt-get install g++-multilib`
- `-m32`
- `gcc-multilib`
- `g++-multilib`

Dynamic Linking Examples

- 1 Example Program
- 2 Dynamic Linking Procedures
- 3 Dynamic Linking Commands

Example Program

```
// main.c -----  
  
void swap();  
  
int buf[2] = {1, 2};  
  
int main()  
{  
    int tmp;  
  
    swap();  
  
    return 0;  
}  
  
// swap.c -----  
  
extern int buf[];  
  
int *p0 = &buf[0];  
int *p1;  
  
void swap()  
{  
    int tmp;  
  
    p1 = &buf[1];  
  
    tmp = *p0;  
    *p0 = *p1;  
    *p1 = tmp;  
}
```

Dynamic Linking Commands

```
gcc -m32 -c -fPIC swap.c
gcc -m32 -shared -Wl,-soname,libswap.so.1 -o libswap.so.1.0.1 swap.o

ln -s libswap.so.1 libswap.so
ldconfig -n .

gcc -m32 -c main.c
gcc -m32 -o p2 main.o -L./ -lswap

LD_LIBRARY_PATH=$LD_LIBRARY_PATH:./

./p2
```

Relocatable Object Files (main.o)

- 1 main.o ELF Header
- 2 main.o Section Header
- 3 main.o Section
- 4 main.o Symbol Table

main.o (1) ELF Header

ELF Header:

```
Magic: 7f 45 4c 46 01 01 01 00 00 00 00 00 00 00 00 00
Class: ELF32
Data: 2's complement, little endian
Version: 1 (current)
OS/ABI: UNIX - System V
ABI Version: 0
Type: REL (Relocatable file)
Machine: Intel 80386
Version: 0x1
Entry point address: 0x0
Start of program headers: 0 (bytes into file)
Start of section headers: 728 (bytes into file)
Flags: 0x0
Size of this header: 52 (bytes)
Size of program headers: 0 (bytes)
Number of program headers: 0
Size of section headers: 40 (bytes)
Number of section headers: 14
Section header string table index: 13
```

main.o (2) Section Header

Section Headers:

| [Nr] | Name | Type | Addr | Off | Size | ES | Flg | Lk | Inf | Al |
|------|-------------------|----------|----------|--------|--------|----|-----|----|-----|----|
| [0] | | NULL | 00000000 | 000000 | 000000 | 00 | | 0 | 0 | 0 |
| [1] | .group | GROUP | 00000000 | 000034 | 000008 | 04 | | 11 | 12 | 4 |
| [2] | .text | PROGBITS | 00000000 | 00003c | 00002c | 00 | AX | 0 | 0 | 1 |
| [3] | .rel.text | REL | 00000000 | 000234 | 000018 | 08 | I | 11 | 2 | 4 |
| [4] | .data | PROGBITS | 00000000 | 000068 | 000008 | 00 | WA | 0 | 0 | 4 |
| [5] | .bss | NOBITS | 00000000 | 000070 | 000000 | 00 | WA | 0 | 0 | 1 |
| [6] | .text.__x86.get_p | PROGBITS | 00000000 | 000070 | 000004 | 00 | AXG | 0 | 0 | 1 |
| [7] | .comment | PROGBITS | 00000000 | 000074 | 00002b | 01 | MS | 0 | 0 | 1 |
| [8] | .note.GNU-stack | PROGBITS | 00000000 | 00009f | 000000 | 00 | | 0 | 0 | 1 |
| [9] | .eh_frame | PROGBITS | 00000000 | 0000a0 | 000060 | 00 | A | 0 | 0 | 4 |
| [10] | .rel.eh_frame | REL | 00000000 | 00024c | 000010 | 08 | I | 11 | 9 | 4 |
| [11] | .symtab | SYMTAB | 00000000 | 000100 | 0000f0 | 10 | | 12 | 10 | 4 |
| [12] | .strtab | STRTAB | 00000000 | 0001f0 | 000042 | 00 | | 0 | 0 | 1 |
| [13] | .shstrtab | STRTAB | 00000000 | 00025c | 00007a | 00 | | 0 | 0 | 1 |

Key to Flags:

W (write), A (alloc), X (execute), M (merge), S (strings), I (info),
L (link order), O (extra OS processing required), G (group), T (TLS),
C (compressed), x (unknown), o (OS specific), E (exclude),
p (processor specific)

main.o (3) Sections

COMDAT group section [1] '.group' [__x86.get_pc_thunk.ax] contains 1 sections

| [Index] | Name |
|---------|-----------------------------|
| [6] | .text.__x86.get_pc_thunk.ax |

There are no program headers in this file.

There is no dynamic section in this file.

Relocation section '.rel.text' at offset 0x234 contains 3 entries:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|----------|-------------|-----------|-----------------------|
| 00000010 | 00000c02 | R_386_PC32 | 00000000 | __x86.get_pc_thunk.ax |
| 00000015 | 00000d0a | R_386_GOTPC | 00000000 | _GLOBAL_OFFSET_TABLE_ |
| 0000001c | 00000e04 | R_386_PLT32 | 00000000 | swap |

Relocation section '.rel.eh_frame' at offset 0x24c contains 2 entries:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|----------|------------|-----------|------------------------|
| 00000020 | 00000202 | R_386_PC32 | 00000000 | .text |
| 00000054 | 00000502 | R_386_PC32 | 00000000 | .text.__x86.get_pc_thu |

The decoding of unwind sections for machine type Intel 80386 is not currently supported

main.o (4) Symbol Table

Symbol table '.symtab' contains 15 entries:

| Num: | Value | Size | Type | Bind | Vis | Ndx | Name |
|------|----------|------|---------|--------|---------|-----|-----------------------|
| 0: | 00000000 | 0 | NOTYPE | LOCAL | DEFAULT | UND | |
| 1: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | main.c |
| 2: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 2 | |
| 3: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 4 | |
| 4: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 5 | |
| 5: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 6 | |
| 6: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 8 | |
| 7: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 9 | |
| 8: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 7 | |
| 9: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 1 | |
| 10: | 00000000 | 8 | OBJECT | GLOBAL | DEFAULT | 4 | buf |
| 11: | 00000000 | 44 | FUNC | GLOBAL | DEFAULT | 2 | main |
| 12: | 00000000 | 0 | FUNC | GLOBAL | HIDDEN | 6 | __x86.get_pc_thunk.ax |
| 13: | 00000000 | 0 | NOTYPE | GLOBAL | DEFAULT | UND | _GLOBAL_OFFSET_TABLE_ |
| 14: | 00000000 | 0 | NOTYPE | GLOBAL | DEFAULT | UND | swap |

No version information found in this file.

PIC Relocatable Object Files (swap.o)

- 1 swap.o ELF Header
- 2 swap.o Section Header
- 3 swap.o Section
- 4 swap.o Symbol Table

swap.o (1) ELF Header

ELF Header:

```
Magic: 7f 45 4c 46 01 01 01 00 00 00 00 00 00 00 00 00
Class: ELF32
Data: 2's complement, little endian
Version: 1 (current)
OS/ABI: UNIX - System V
ABI Version: 0
Type: REL (Relocatable file)
Machine: Intel 80386
Version: 0x1
Entry point address: 0x0
Start of program headers: 0 (bytes into file)
Start of section headers: 836 (bytes into file)
Flags: 0x0
Size of this header: 52 (bytes)
Size of program headers: 0 (bytes)
Number of program headers: 0
Size of section headers: 40 (bytes)
Number of section headers: 16
Section header string table index: 15
```

swap.o (2) Section Header

Section Headers:

| [Nr] | Name | Type | Addr | Off | Size | ES | Flg | Lk | Inf | Al |
|------|-------------------|----------|----------|--------|--------|----|-----|----|-----|----|
| [0] | | NULL | 00000000 | 000000 | 000000 | 00 | | 0 | 0 | 0 |
| [1] | .group | GROUP | 00000000 | 000034 | 000008 | 04 | | 13 | 15 | 4 |
| [2] | .text | PROGBITS | 00000000 | 00003c | 000052 | 00 | AX | 0 | 0 | 1 |
| [3] | .rel.text | REL | 00000000 | 000264 | 000040 | 08 | I | 13 | 2 | 4 |
| [4] | .data | PROGBITS | 00000000 | 00008e | 000000 | 00 | WA | 0 | 0 | 1 |
| [5] | .bss | NOBITS | 00000000 | 00008e | 000000 | 00 | WA | 0 | 0 | 1 |
| [6] | .data.rel | PROGBITS | 00000000 | 000090 | 000004 | 00 | WA | 0 | 0 | 4 |
| [7] | .rel.data.rel | REL | 00000000 | 0002a4 | 000008 | 08 | I | 13 | 6 | 4 |
| [8] | .text.__x86.get_p | PROGBITS | 00000000 | 000094 | 000004 | 00 | AXG | 0 | 0 | 1 |
| [9] | .comment | PROGBITS | 00000000 | 000098 | 00002b | 01 | MS | 0 | 0 | 1 |
| [10] | .note.GNU-stack | PROGBITS | 00000000 | 0000c3 | 000000 | 00 | | 0 | 0 | 1 |
| [11] | .eh_frame | PROGBITS | 00000000 | 0000c4 | 00004c | 00 | A | 0 | 0 | 4 |
| [12] | .rel.eh_frame | REL | 00000000 | 0002ac | 000010 | 08 | I | 13 | 11 | 4 |
| [13] | .symtab | SYMTAB | 00000000 | 000110 | 000110 | 10 | | 14 | 11 | 4 |
| [14] | .strtab | STRTAB | 00000000 | 000220 | 000043 | 00 | | 0 | 0 | 1 |
| [15] | .shstrtab | STRTAB | 00000000 | 0002bc | 000088 | 00 | | 0 | 0 | 1 |

Key to Flags:

W (write), A (alloc), X (execute), M (merge), S (strings), I (info),
L (link order), O (extra OS processing required), G (group), T (TLS),
C (compressed), x (unknown), o (OS specific), E (exclude),
p (processor specific)

swap.o (3) Sections

```
COMDAT group section [ 1] '.group' [__x86.get_pc_thunk.ax] contains 1 sections
[Index]   Name
[ 8]     .text.__x86.get_pc_thunk.ax
```

There are no program headers in this file.

There is no dynamic section in this file.

Relocation section '.rel.text' at offset 0x264 contains 8 entries:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|----------|--------------|-----------|-----------------------|
| 00000007 | 0000f02 | R_386_PC32 | 00000000 | __x86.get_pc_thunk.ax |
| 0000000c | 0000100a | R_386_GOTPC | 00000000 | _GLOBAL_OFFSET_TABLE_ |
| 00000012 | 0000d2b | R_386_GOT32X | 00000004 | p1 |
| 00000018 | 0000c2b | R_386_GOT32X | 00000000 | buf |
| 00000023 | 0000b2b | R_386_GOT32X | 00000000 | p0 |
| 00000030 | 0000d2b | R_386_GOT32X | 00000004 | p1 |
| 00000038 | 0000b2b | R_386_GOT32X | 00000000 | p0 |
| 00000044 | 0000d2b | R_386_GOT32X | 00000004 | p1 |

Relocation section '.rel.data.rel' at offset 0x2a4 contains 1 entry:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|---------|----------|-----------|-----------|
| 00000000 | 0000c01 | R_386_32 | 00000000 | buf |

Relocation section '.rel.eh_frame' at offset 0x2ac contains 2 entries:

swap.o (4) Symbol Table

Symbol table '.symtab' contains 17 entries:

| Num: | Value | Size | Type | Bind | Vis | Ndx | Name |
|------|----------|------|---------|--------|---------|-----|-----------------------|
| 0: | 00000000 | 0 | NOTYPE | LOCAL | DEFAULT | UND | |
| 1: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | swap.c |
| 2: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 2 | |
| 3: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 4 | |
| 4: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 5 | |
| 5: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 6 | |
| 6: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 8 | |
| 7: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 10 | |
| 8: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 11 | |
| 9: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 9 | |
| 10: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 1 | |
| 11: | 00000000 | 4 | OBJECT | GLOBAL | DEFAULT | 6 | p0 |
| 12: | 00000000 | 0 | NOTYPE | GLOBAL | DEFAULT | UND | buf |
| 13: | 00000004 | 4 | OBJECT | GLOBAL | DEFAULT | COM | p1 |
| 14: | 00000000 | 82 | FUNC | GLOBAL | DEFAULT | 2 | swap |
| 15: | 00000000 | 0 | FUNC | GLOBAL | HIDDEN | 8 | __x86.get_pc_thunk.ax |
| 16: | 00000000 | 0 | NOTYPE | GLOBAL | DEFAULT | UND | _GLOBAL_OFFSET_TABLE_ |

No version information found in this file.

Executable Object Files (libswap.so.1.0.1)

- 1 libswap.so.1.0.1 ELF Header
- 2 libswap.so.1.0.1 Section Header
- 3 libswap.so.1.0.1 Program Header
- 4 libswap.so.1.0.1 Section to Segment Mapping
- 5 libswap.so.1.0.1 Dynamic Sections
- 6 libswap.so.1.0.1 Misc Sections
- 7 libswap.so.1.0.1 Symbol Table
- 8 libswap.so.1.0.1 Others

libswap.so.1.0.1 (1) ELF Header

ELF Header:

```
Magic: 7f 45 4c 46 01 01 01 00 00 00 00 00 00 00 00
Class: ELF32
Data: 2's complement, little endian
Version: 1 (current)
OS/ABI: UNIX - System V
ABI Version: 0
Type: DYN (Shared object file)
Machine: Intel 80386
Version: 0x1
Entry point address: 0x390
Start of program headers: 52 (bytes into file)
Start of section headers: 5668 (bytes into file)
Flags: 0x0
Size of this header: 52 (bytes)
Size of program headers: 32 (bytes)
Number of program headers: 7
Size of section headers: 40 (bytes)
Number of section headers: 24
Section header string table index: 23
```

libswap.so.1.0.1 (2) Section Header (a)

Section Headers:

| [Nr] | Name | Type | Addr | Off | Size | ES | Flg | Lk | Inf | Al |
|------|--------------------|------------|----------|--------|--------|----|-----|----|-----|----|
| [0] | | NULL | 00000000 | 000000 | 000000 | 00 | | 0 | 0 | 0 |
| [1] | .note.gnu.build-id | NOTE | 00000114 | 000114 | 000024 | 00 | A | 0 | 0 | 4 |
| [2] | .gnu.hash | GNU_HASH | 00000138 | 000138 | 000044 | 04 | A | 3 | 0 | 4 |
| [3] | .dynsym | DYNSYM | 0000017c | 00017c | 0000e0 | 10 | A | 4 | 1 | 4 |
| [4] | .dynstr | STRTAB | 0000025c | 00025c | 000095 | 00 | A | 0 | 0 | 1 |
| [5] | .rel.dyn | REL | 000002f4 | 0002f4 | 000058 | 08 | A | 3 | 0 | 4 |
| [6] | .init | PROGBITS | 0000034c | 00034c | 000023 | 00 | AX | 0 | 0 | 4 |
| [7] | .plt | PROGBITS | 00000370 | 000370 | 000010 | 04 | AX | 0 | 0 | 16 |
| [8] | .plt.got | PROGBITS | 00000380 | 000380 | 000010 | 08 | AX | 0 | 0 | 8 |
| [9] | .text | PROGBITS | 00000390 | 000390 | 000153 | 00 | AX | 0 | 0 | 16 |
| [10] | .fini | PROGBITS | 000004e4 | 0004e4 | 000014 | 00 | AX | 0 | 0 | 4 |
| [11] | .eh_frame_hdr | PROGBITS | 000004f8 | 0004f8 | 00002c | 00 | A | 0 | 0 | 4 |
| [12] | .eh_frame | PROGBITS | 00000524 | 000524 | 000088 | 00 | A | 0 | 0 | 4 |
| [13] | .init_array | INIT_ARRAY | 00001f2c | 000f2c | 000004 | 04 | WA | 0 | 0 | 4 |
| [14] | .fini_array | FINI_ARRAY | 00001f30 | 000f30 | 000004 | 04 | WA | 0 | 0 | 4 |
| [15] | .dynamic | DYNAMIC | 00001f34 | 000f34 | 0000b0 | 08 | WA | 4 | 0 | 4 |
| [16] | .got | PROGBITS | 00001fe4 | 000fe4 | 00001c | 04 | WA | 0 | 0 | 4 |
| [17] | .got.plt | PROGBITS | 00002000 | 001000 | 00000c | 04 | WA | 0 | 0 | 4 |
| [18] | .data | PROGBITS | 0000200c | 00100c | 000008 | 00 | WA | 0 | 0 | 4 |
| [19] | .bss | NOBITS | 00002014 | 001014 | 000008 | 00 | WA | 0 | 0 | 4 |
| [20] | .comment | PROGBITS | 00000000 | 001014 | 00002a | 01 | MS | 0 | 0 | 1 |

libswap.so.1.0.1 (3) Section Header (b)

| | | | | | | | | | |
|------|-----------|--------|----------|--------|--------|----|----|----|---|
| [21] | .symtab | SYMTAB | 00000000 | 001040 | 000360 | 10 | 22 | 41 | 4 |
| [22] | .strtab | STRTAB | 00000000 | 0013a0 | 0001c1 | 00 | 0 | 0 | 1 |
| [23] | .shstrtab | STRTAB | 00000000 | 001561 | 0000c2 | 00 | 0 | 0 | 1 |

Key to Flags:

W (write), A (alloc), X (execute), M (merge), S (strings), I (info),
L (link order), O (extra OS processing required), G (group), T (TLS),
C (compressed), x (unknown), o (OS specific), E (exclude),
p (processor specific)

There are no section groups in this file.

Program Headers:

| Type | Offset | VirtAddr | PhysAddr | FileSiz | MemSiz | Flg | Align |
|--------------|----------|------------|------------|---------|---------|-----|--------|
| LOAD | 0x000000 | 0x00000000 | 0x00000000 | 0x005ac | 0x005ac | R E | 0x1000 |
| LOAD | 0x000f2c | 0x00001f2c | 0x00001f2c | 0x000e8 | 0x000f0 | RW | 0x1000 |
| DYNAMIC | 0x000f34 | 0x00001f34 | 0x00001f34 | 0x000b0 | 0x000b0 | RW | 0x4 |
| NOTE | 0x000114 | 0x00000114 | 0x00000114 | 0x00024 | 0x00024 | R | 0x4 |
| GNU_EH_FRAME | 0x0004f8 | 0x000004f8 | 0x000004f8 | 0x0002c | 0x0002c | R | 0x4 |
| GNU_STACK | 0x000000 | 0x00000000 | 0x00000000 | 0x00000 | 0x00000 | RW | 0x10 |
| GNU_RELRO | 0x000f2c | 0x00001f2c | 0x00001f2c | 0x000d4 | 0x000d4 | R | 0x1 |

libswap.so.1.0.1 (5) Section to Segment Mapping

Section to Segment mapping:

Segment Sections...

```
00      .note.gnu.build-id .gnu.hash .dynsym .dynstr .rel.dyn .init .plt .plt.got
01      .init_array .fini_array .dynamic .got .got.plt .data .bss
02      .dynamic
03      .note.gnu.build-id
04      .eh_frame_hdr
05
06      .init_array .fini_array .dynamic .got
```

libswap.so.1.0.1 (6) Dynamic Sections

Dynamic section at offset 0xf34 contains 18 entries:

| Tag | Type | Name/Value |
|------------|----------------|--------------------------------|
| 0x0000000e | (SONAME) | Library soname: [libswap.so.1] |
| 0x0000000c | (INIT) | 0x34c |
| 0x0000000d | (FINI) | 0x4e4 |
| 0x00000019 | (INIT_ARRAY) | 0x1f2c |
| 0x0000001b | (INIT_ARRAYSZ) | 4 (bytes) |
| 0x0000001a | (FINI_ARRAY) | 0x1f30 |
| 0x0000001c | (FINI_ARRAYSZ) | 4 (bytes) |
| 0x6ffffef5 | (GNU_HASH) | 0x138 |
| 0x00000005 | (STRTAB) | 0x25c |
| 0x00000006 | (SYMTAB) | 0x17c |
| 0x0000000a | (STRSZ) | 149 (bytes) |
| 0x0000000b | (SYMENT) | 16 (bytes) |
| 0x00000003 | (PLTGOT) | 0x2000 |
| 0x00000011 | (REL) | 0x2f4 |
| 0x00000012 | (RELSZ) | 88 (bytes) |
| 0x00000013 | (RELENT) | 8 (bytes) |
| 0x6fffffff | (RELCOUNT) | 3 |
| 0x00000000 | (NULL) | 0x0 |

Relocation section '.rel.dyn' at offset 0x2f4 contains 11 entries:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|----------|----------------|-----------|------------------------|
| 00001f2c | 00000008 | R_386_RELATIVE | | |
| 00001f30 | 00000008 | R_386_RELATIVE | | |
| 0000200c | 00000008 | R_386_RELATIVE | | |
| 00001fe4 | 00000606 | R_386_GLOB_DAT | 00002010 | p0 |
| 00001fe8 | 00000106 | R_386_GLOB_DAT | 00000000 | __cxa_finalize |
| 00001fec | 00000b06 | R_386_GLOB_DAT | 00002018 | p1 |
| 00001ff0 | 00000206 | R_386_GLOB_DAT | 00000000 | _ITM_registerTMCloneTa |
| 00001ff4 | 00000306 | R_386_GLOB_DAT | 00000000 | _ITM_deregisterTMClone |
| 00001ff8 | 00000406 | R_386_GLOB_DAT | 00000000 | buf |
| 00002010 | 00000401 | R_386_32 | 00000000 | buf |
| 00001ffc | 00000506 | R_386_GLOB_DAT | 00000000 | __gmon_start__ |

The decoding of unwind sections for machine type Intel 80386 is not currently supported

libswap.so.1.0.1 (8) Symbol Table .dynsym Sections

Symbol table '.dynsym' contains 14 entries:

| Num: | Value | Size | Type | Bind | Vis | Ndx | Name |
|------|----------|------|--------|--------|---------|-----|---------------------------|
| 0: | 00000000 | 0 | NOTYPE | LOCAL | DEFAULT | UND | |
| 1: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __cxa_finalize |
| 2: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | _ITM_registerTMCloneTable |
| 3: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | _ITM_deregisterTMCloneTab |
| 4: | 00000000 | 0 | NOTYPE | GLOBAL | DEFAULT | UND | buf |
| 5: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __gmon_start__ |
| 6: | 00002010 | 4 | OBJECT | GLOBAL | DEFAULT | 18 | p0 |
| 7: | 0000048d | 82 | FUNC | GLOBAL | DEFAULT | 9 | swap |
| 8: | 00002014 | 0 | NOTYPE | GLOBAL | DEFAULT | 18 | _edata |
| 9: | 0000201c | 0 | NOTYPE | GLOBAL | DEFAULT | 19 | _end |
| 10: | 0000034c | 0 | FUNC | GLOBAL | DEFAULT | 6 | _init |
| 11: | 00002018 | 4 | OBJECT | GLOBAL | DEFAULT | 19 | p1 |
| 12: | 00002014 | 0 | NOTYPE | GLOBAL | DEFAULT | 19 | __bss_start |
| 13: | 000004e4 | 0 | FUNC | GLOBAL | DEFAULT | 10 | _fini |

libswap.so.1.0.1 (9) Symbol Table .symtab (a)

Symbol table '.symtab' contains 54 entries:

| Num: | Value | Size | Type | Bind | Vis | Ndx | Name |
|------|----------|------|---------|-------|---------|-----|------|
| 0: | 00000000 | 0 | NOTYPE | LOCAL | DEFAULT | UND | |
| 1: | 00000114 | 0 | SECTION | LOCAL | DEFAULT | 1 | |
| 2: | 00000138 | 0 | SECTION | LOCAL | DEFAULT | 2 | |
| 3: | 0000017c | 0 | SECTION | LOCAL | DEFAULT | 3 | |
| 4: | 0000025c | 0 | SECTION | LOCAL | DEFAULT | 4 | |
| 5: | 000002f4 | 0 | SECTION | LOCAL | DEFAULT | 5 | |
| 6: | 0000034c | 0 | SECTION | LOCAL | DEFAULT | 6 | |
| 7: | 00000370 | 0 | SECTION | LOCAL | DEFAULT | 7 | |
| 8: | 00000380 | 0 | SECTION | LOCAL | DEFAULT | 8 | |
| 9: | 00000390 | 0 | SECTION | LOCAL | DEFAULT | 9 | |
| 10: | 000004e4 | 0 | SECTION | LOCAL | DEFAULT | 10 | |
| 11: | 000004f8 | 0 | SECTION | LOCAL | DEFAULT | 11 | |
| 12: | 00000524 | 0 | SECTION | LOCAL | DEFAULT | 12 | |
| 13: | 00001f2c | 0 | SECTION | LOCAL | DEFAULT | 13 | |
| 14: | 00001f30 | 0 | SECTION | LOCAL | DEFAULT | 14 | |
| 15: | 00001f34 | 0 | SECTION | LOCAL | DEFAULT | 15 | |
| 16: | 00001fe4 | 0 | SECTION | LOCAL | DEFAULT | 16 | |
| 17: | 00002000 | 0 | SECTION | LOCAL | DEFAULT | 17 | |
| 18: | 0000200c | 0 | SECTION | LOCAL | DEFAULT | 18 | |
| 19: | 00002014 | 0 | SECTION | LOCAL | DEFAULT | 19 | |
| 20: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 20 | |

libswap.so.1.0.1 (10) Symbol Table .symtab (b)

| | | | | | | | |
|-----|----------|---|--------|-------|---------|-----|---------------------------|
| 21: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | crtstuff.c |
| 22: | 000003a0 | 0 | FUNC | LOCAL | DEFAULT | 9 | deregister_tm_clones |
| 23: | 000003e0 | 0 | FUNC | LOCAL | DEFAULT | 9 | register_tm_clones |
| 24: | 00000430 | 0 | FUNC | LOCAL | DEFAULT | 9 | __do_global_dtors_aux |
| 25: | 00002014 | 1 | OBJECT | LOCAL | DEFAULT | 19 | completed.7281 |
| 26: | 00001f30 | 0 | OBJECT | LOCAL | DEFAULT | 14 | __do_global_dtors_aux_fin |
| 27: | 00000480 | 0 | FUNC | LOCAL | DEFAULT | 9 | frame_dummy |
| 28: | 00001f2c | 0 | OBJECT | LOCAL | DEFAULT | 13 | __frame_dummy_init_array_ |
| 29: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | swap.c |
| 30: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | crtstuff.c |
| 31: | 000005a8 | 0 | OBJECT | LOCAL | DEFAULT | 12 | __FRAME_END__ |
| 32: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | |
| 33: | 00001f34 | 0 | OBJECT | LOCAL | DEFAULT | 15 | _DYNAMIC |
| 34: | 00002014 | 0 | OBJECT | LOCAL | DEFAULT | 18 | __TMC_END__ |
| 35: | 000004df | 0 | FUNC | LOCAL | DEFAULT | 9 | __x86.get_pc_thunk.ax |
| 36: | 0000200c | 0 | OBJECT | LOCAL | DEFAULT | 18 | __dso_handle |
| 37: | 00000489 | 0 | FUNC | LOCAL | DEFAULT | 9 | __x86.get_pc_thunk.dx |
| 38: | 00000390 | 4 | FUNC | LOCAL | DEFAULT | 9 | __x86.get_pc_thunk.bx |
| 39: | 000004f8 | 0 | NOTYPE | LOCAL | DEFAULT | 11 | __GNU_EH_FRAME_HDR |
| 40: | 00002000 | 0 | OBJECT | LOCAL | DEFAULT | 17 | _GLOBAL_OFFSET_TABLE_ |

libswap.so.1.0.1 (11) Symbol Table .symtab (c)

| | | | | | | |
|--------------|----|--------|--------|---------|-----|---------------------------|
| 41: 00002010 | 4 | OBJECT | GLOBAL | DEFAULT | 18 | p0 |
| 42: 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __cxa_finalize |
| 43: 0000048d | 82 | FUNC | GLOBAL | DEFAULT | 9 | swap |
| 44: 0000034c | 0 | FUNC | GLOBAL | DEFAULT | 6 | _init |
| 45: 00002018 | 4 | OBJECT | GLOBAL | DEFAULT | 19 | p1 |
| 46: 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | _ITM_registerTMCloneTable |
| 47: 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | _ITM_deregisterTMCloneTab |
| 48: 00002014 | 0 | NOTYPE | GLOBAL | DEFAULT | 19 | __bss_start |
| 49: 000004e4 | 0 | FUNC | GLOBAL | DEFAULT | 10 | _fini |
| 50: 00000000 | 0 | NOTYPE | GLOBAL | DEFAULT | UND | buf |
| 51: 00002014 | 0 | NOTYPE | GLOBAL | DEFAULT | 18 | _edata |
| 52: 0000201c | 0 | NOTYPE | GLOBAL | DEFAULT | 19 | _end |
| 53: 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __gmon_start__ |

Histogram for `‘.gnu.hash’` bucket list length (total of 3 buckets):

| Length | Number | % of total | Coverage |
|--------|--------|------------|----------|
| 0 | 0 | (0.0%) | |
| 1 | 1 | (33.3%) | 12.5% |
| 2 | 0 | (0.0%) | 12.5% |
| 3 | 1 | (33.3%) | 50.0% |
| 4 | 1 | (33.3%) | 100.0% |

No version information found in this file.

Displaying notes found in: `.note.gnu.build-id`

| Owner | Data size | Description |
|--|------------|---|
| GNU | 0x00000014 | NT_GNU_BUILD_ID (unique build ID bitstring) |
| Build ID: 9e2b2bea085b7ed0e63fc422497cd93b6d84da15 | | |

Executable Object Files (p2)

- 1 p ELF Header
- 2 p Section Header
- 3 p Program Header
- 4 p Section to Segment Mapping
- 5 p Dynamic Sections
- 6 p Misc Sections
- 7 p Symbol Table
- 8 p Others

p2 (1) ELF Header

ELF Header:

```
Magic: 7f 45 4c 46 01 01 01 00 00 00 00 00 00 00 00 00
Class: ELF32
Data: 2's complement, little endian
Version: 1 (current)
OS/ABI: UNIX - System V
ABI Version: 0
Type: DYN (Shared object file)
Machine: Intel 80386
Version: 0x1
Entry point address: 0x4a0
Start of program headers: 52 (bytes into file)
Start of section headers: 6072 (bytes into file)
Flags: 0x0
Size of this header: 52 (bytes)
Size of program headers: 32 (bytes)
Number of program headers: 9
Size of section headers: 40 (bytes)
Number of section headers: 29
Section header string table index: 28
```

p2 (2) Section Header (a)

Section Headers:

| [Nr] | Name | Type | Addr | Off | Size | ES | Flg | Lk | Inf | Al |
|------|-------------------|------------|----------|--------|--------|----|-----|----|-----|----|
| [0] | | NULL | 00000000 | 000000 | 000000 | 00 | | 0 | 0 | 0 |
| [1] | .interp | PROGBITS | 00000154 | 000154 | 000013 | 00 | A | 0 | 0 | 1 |
| [2] | .note.ABI-tag | NOTE | 00000168 | 000168 | 000020 | 00 | A | 0 | 0 | 4 |
| [3] | .note.gnu.build-i | NOTE | 00000188 | 000188 | 000024 | 00 | A | 0 | 0 | 4 |
| [4] | .gnu.hash | GNU_HASH | 000001ac | 0001ac | 000040 | 04 | A | 5 | 0 | 4 |
| [5] | .dynsym | DYNSYM | 000001ec | 0001ec | 0000e0 | 10 | A | 6 | 1 | 4 |
| [6] | .dynstr | STRTAB | 000002cc | 0002cc | 0000d0 | 00 | A | 0 | 0 | 1 |
| [7] | .gnu.version | VERSYM | 0000039c | 00039c | 00001c | 02 | A | 5 | 0 | 2 |
| [8] | .gnu.version_r | VERNEED | 000003b8 | 0003b8 | 000030 | 00 | A | 6 | 1 | 4 |
| [9] | .rel.dyn | REL | 000003e8 | 0003e8 | 000040 | 08 | A | 5 | 0 | 4 |
| [10] | .rel.plt | REL | 00000428 | 000428 | 000010 | 08 | AI | 5 | 22 | 4 |
| [11] | .init | PROGBITS | 00000438 | 000438 | 000023 | 00 | AX | 0 | 0 | 4 |
| [12] | .plt | PROGBITS | 00000460 | 000460 | 000030 | 04 | AX | 0 | 0 | 16 |
| [13] | .plt.got | PROGBITS | 00000490 | 000490 | 000010 | 08 | AX | 0 | 0 | 8 |
| [14] | .text | PROGBITS | 000004a0 | 0004a0 | 0001d2 | 00 | AX | 0 | 0 | 16 |
| [15] | .fini | PROGBITS | 00000674 | 000674 | 000014 | 00 | AX | 0 | 0 | 4 |
| [16] | .rodata | PROGBITS | 00000688 | 000688 | 000008 | 00 | A | 0 | 0 | 4 |
| [17] | .eh_frame_hdr | PROGBITS | 00000690 | 000690 | 00003c | 00 | A | 0 | 0 | 4 |
| [18] | .eh_frame | PROGBITS | 000006cc | 0006cc | 0000fc | 00 | A | 0 | 0 | 4 |
| [19] | .init_array | INIT_ARRAY | 00001ed0 | 000ed0 | 000004 | 04 | WA | 0 | 0 | 4 |
| [20] | .fini_array | FINI_ARRAY | 00001ed4 | 000ed4 | 000004 | 04 | WA | 0 | 0 | 4 |

p2 (3) Section Header (b)

| | | | | | | | | | | |
|------|-----------|----------|----------|--------|--------|----|----|----|----|---|
| [21] | .dynamic | DYNAMIC | 00001ed8 | 000ed8 | 000100 | 08 | WA | 6 | 0 | 4 |
| [22] | .got | PROGBITS | 00001fd8 | 000fd8 | 000028 | 04 | WA | 0 | 0 | 4 |
| [23] | .data | PROGBITS | 00002000 | 001000 | 000010 | 00 | WA | 0 | 0 | 4 |
| [24] | .bss | NOBITS | 00002010 | 001010 | 000004 | 00 | WA | 0 | 0 | 1 |
| [25] | .comment | PROGBITS | 00000000 | 001010 | 00002a | 01 | MS | 0 | 0 | 1 |
| [26] | .symtab | SYMTAB | 00000000 | 00103c | 000440 | 10 | | 27 | 43 | 4 |
| [27] | .strtab | STRTAB | 00000000 | 00147c | 000240 | 00 | | 0 | 0 | 1 |
| [28] | .shstrtab | STRTAB | 00000000 | 0016bc | 0000fc | 00 | | 0 | 0 | 1 |

Key to Flags:

W (write), A (alloc), X (execute), M (merge), S (strings), I (info),
L (link order), O (extra OS processing required), G (group), T (TLS),
C (compressed), x (unknown), o (OS specific), E (exclude),
p (processor specific)

There are no section groups in this file.

p2 (4) Program Header

Program Headers:

| Type | Offset | VirtAddr | PhysAddr | FileSiz | MemSiz | Flg | Align |
|--|----------|------------|------------|---------|---------|-----|--------|
| PHDR | 0x000034 | 0x00000034 | 0x00000034 | 0x00120 | 0x00120 | R | 0x4 |
| INTERP | 0x000154 | 0x00000154 | 0x00000154 | 0x00013 | 0x00013 | R | 0x1 |
| [Requesting program interpreter: /lib/ld-linux.so.2] | | | | | | | |
| LOAD | 0x000000 | 0x00000000 | 0x00000000 | 0x007c8 | 0x007c8 | R E | 0x1000 |
| LOAD | 0x000ed0 | 0x00001ed0 | 0x00001ed0 | 0x00140 | 0x00144 | RW | 0x1000 |
| DYNAMIC | 0x000ed8 | 0x00001ed8 | 0x00001ed8 | 0x00100 | 0x00100 | RW | 0x4 |
| NOTE | 0x000168 | 0x00000168 | 0x00000168 | 0x00044 | 0x00044 | R | 0x4 |
| GNU_EH_FRAME | 0x000690 | 0x00000690 | 0x00000690 | 0x0003c | 0x0003c | R | 0x4 |
| GNU_STACK | 0x000000 | 0x00000000 | 0x00000000 | 0x00000 | 0x00000 | RW | 0x10 |
| GNU_RELRO | 0x000ed0 | 0x00001ed0 | 0x00001ed0 | 0x00130 | 0x00130 | R | 0x1 |

p2 (5) Section to Segment Mapping

Section to Segment mapping:

Segment Sections...

00

01 .interp

02 .interp .note.ABI-tag .note.gnu.build-id .gnu.hash .dynsym .dynstr .gnu.v

03 .init_array .fini_array .dynamic .got .data .bss

04 .dynamic

05 .note.ABI-tag .note.gnu.build-id

06 .eh_frame_hdr

07

08 .init_array .fini_array .dynamic .got

p2 (6) Dynamic Sections (a)

Dynamic section at offset 0xed8 contains 28 entries:

| Tag | Type | Name/Value |
|------------|----------------|--------------------------------|
| 0x00000001 | (NEEDED) | Shared library: [libswap.so.1] |
| 0x00000001 | (NEEDED) | Shared library: [libc.so.6] |
| 0x0000000c | (INIT) | 0x438 |
| 0x0000000d | (FINI) | 0x674 |
| 0x00000019 | (INIT_ARRAY) | 0x1ed0 |
| 0x0000001b | (INIT_ARRAYSZ) | 4 (bytes) |
| 0x0000001a | (FINI_ARRAY) | 0x1ed4 |
| 0x0000001c | (FINI_ARRAYSZ) | 4 (bytes) |
| 0x6ffffef5 | (GNU_HASH) | 0x1ac |
| 0x00000005 | (STRTAB) | 0x2cc |
| 0x00000006 | (SYMTAB) | 0x1ec |
| 0x0000000a | (STRSZ) | 208 (bytes) |
| 0x0000000b | (SYMENT) | 16 (bytes) |
| 0x00000015 | (DEBUG) | 0x0 |
| 0x00000003 | (PLTGOT) | 0x1fd8 |
| 0x00000002 | (PLTRELSZ) | 16 (bytes) |
| 0x00000014 | (PLTREL) | REL |
| 0x00000017 | (JMPREL) | 0x428 |
| 0x00000011 | (REL) | 0x3e8 |
| 0x00000012 | (RELSZ) | 64 (bytes) |
| 0x00000013 | (RELENT) | 8 (bytes) |
| 0x0000001e | (FLAGS) | BIND_NOW |

p2 (7) Dynamic Sections (b)

| | |
|---------------------------|----------------|
| 0x6fffffff b (FLAGS_1) | Flags: NOW PIE |
| 0x6fffffff e (VERNEED) | 0x3b8 |
| 0x6fffffff f (VERNEEDNUM) | 1 |
| 0x6fffffff 0 (VERSYM) | 0x39c |
| 0x6fffffff a (RELCOUNT) | 4 |
| 0x00000000 (NULL) | 0x0 |

p2 (8) Misc Sections

Relocation section '.rel.dyn' at offset 0x3e8 contains 8 entries:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|----------|----------------|-----------|----------------------------|
| 00001ed0 | 00000008 | R_386_RELATIVE | | |
| 00001ed4 | 00000008 | R_386_RELATIVE | | |
| 00001ff8 | 00000008 | R_386_RELATIVE | | |
| 00002004 | 00000008 | R_386_RELATIVE | | |
| 00001fec | 00000106 | R_386_GLOB_DAT | 00000000 | _ITM_deregisterTMClone |
| 00001ff0 | 00000206 | R_386_GLOB_DAT | 00000000 | __cxa_finalize@GLIBC_2.1.3 |
| 00001ff4 | 00000306 | R_386_GLOB_DAT | 00000000 | __gmon_start__ |
| 00001ffc | 00000506 | R_386_GLOB_DAT | 00000000 | _ITM_registerTMCloneTa |

Relocation section '.rel.plt' at offset 0x428 contains 2 entries:

| Offset | Info | Type | Sym.Value | Sym. Name |
|----------|----------|-----------------|-----------|-----------------------------|
| 00001fe4 | 00000407 | R_386_JUMP_SLOT | 00000000 | __libc_start_main@GLIBC_2.0 |
| 00001fe8 | 00000607 | R_386_JUMP_SLOT | 00000000 | swap |

The decoding of unwind sections for machine type Intel 80386 is not currently supported

p2 (9) Symbol table .dynsym

Symbol table '.dynsym' contains 14 entries:

| Num: | Value | Size | Type | Bind | Vis | Ndx | Name |
|------|----------|------|--------|--------|---------|-----|---------------------------------|
| 0: | 00000000 | 0 | NOTYPE | LOCAL | DEFAULT | UND | |
| 1: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | _ITM_deregisterTMCloneTab |
| 2: | 00000000 | 0 | FUNC | WEAK | DEFAULT | UND | __cxa_finalize@GLIBC_2.1.3 (2) |
| 3: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __gmon_start__ |
| 4: | 00000000 | 0 | FUNC | GLOBAL | DEFAULT | UND | __libc_start_main@GLIBC_2.0 (3) |
| 5: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | _ITM_registerTMCloneTable |
| 6: | 00000000 | 0 | FUNC | GLOBAL | DEFAULT | UND | swap |
| 7: | 00002010 | 0 | NOTYPE | GLOBAL | DEFAULT | 23 | _edata |
| 8: | 00002014 | 0 | NOTYPE | GLOBAL | DEFAULT | 24 | _end |
| 9: | 00002008 | 8 | OBJECT | GLOBAL | DEFAULT | 23 | buf |
| 10: | 0000068c | 4 | OBJECT | GLOBAL | DEFAULT | 16 | _IO_stdin_used |
| 11: | 00002010 | 0 | NOTYPE | GLOBAL | DEFAULT | 24 | __bss_start |
| 12: | 00000438 | 0 | FUNC | GLOBAL | DEFAULT | 11 | _init |
| 13: | 00000674 | 0 | FUNC | GLOBAL | DEFAULT | 15 | _fini |

p2 (9) Symbol Table .symtab (a)

Symbol table '.symtab' contains 68 entries:

| Num: | Value | Size | Type | Bind | Vis | Ndx | Name |
|------|----------|------|---------|-------|---------|-----|------|
| 0: | 00000000 | 0 | NOTYPE | LOCAL | DEFAULT | UND | |
| 1: | 00000154 | 0 | SECTION | LOCAL | DEFAULT | 1 | |
| 2: | 00000168 | 0 | SECTION | LOCAL | DEFAULT | 2 | |
| 3: | 00000188 | 0 | SECTION | LOCAL | DEFAULT | 3 | |
| 4: | 000001ac | 0 | SECTION | LOCAL | DEFAULT | 4 | |
| 5: | 000001ec | 0 | SECTION | LOCAL | DEFAULT | 5 | |
| 6: | 000002cc | 0 | SECTION | LOCAL | DEFAULT | 6 | |
| 7: | 0000039c | 0 | SECTION | LOCAL | DEFAULT | 7 | |
| 8: | 000003b8 | 0 | SECTION | LOCAL | DEFAULT | 8 | |
| 9: | 000003e8 | 0 | SECTION | LOCAL | DEFAULT | 9 | |
| 10: | 00000428 | 0 | SECTION | LOCAL | DEFAULT | 10 | |
| 11: | 00000438 | 0 | SECTION | LOCAL | DEFAULT | 11 | |
| 12: | 00000460 | 0 | SECTION | LOCAL | DEFAULT | 12 | |
| 13: | 00000490 | 0 | SECTION | LOCAL | DEFAULT | 13 | |
| 14: | 000004a0 | 0 | SECTION | LOCAL | DEFAULT | 14 | |
| 15: | 00000674 | 0 | SECTION | LOCAL | DEFAULT | 15 | |
| 16: | 00000688 | 0 | SECTION | LOCAL | DEFAULT | 16 | |
| 17: | 00000690 | 0 | SECTION | LOCAL | DEFAULT | 17 | |
| 18: | 000006cc | 0 | SECTION | LOCAL | DEFAULT | 18 | |
| 19: | 00001ed0 | 0 | SECTION | LOCAL | DEFAULT | 19 | |
| 20: | 00001ed4 | 0 | SECTION | LOCAL | DEFAULT | 20 | |

p2 (10) Symbol Table .symtab (b)

| | | | | | | | |
|-----|----------|---|---------|-------|---------|-----|---------------------------|
| 21: | 00001ed8 | 0 | SECTION | LOCAL | DEFAULT | 21 | |
| 22: | 00001fd8 | 0 | SECTION | LOCAL | DEFAULT | 22 | |
| 23: | 00002000 | 0 | SECTION | LOCAL | DEFAULT | 23 | |
| 24: | 00002010 | 0 | SECTION | LOCAL | DEFAULT | 24 | |
| 25: | 00000000 | 0 | SECTION | LOCAL | DEFAULT | 25 | |
| 26: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | crtstuff.c |
| 27: | 000004f0 | 0 | FUNC | LOCAL | DEFAULT | 14 | deregister_tm_clones |
| 28: | 00000530 | 0 | FUNC | LOCAL | DEFAULT | 14 | register_tm_clones |
| 29: | 00000580 | 0 | FUNC | LOCAL | DEFAULT | 14 | __do_global_dtors_aux |
| 30: | 00002010 | 1 | OBJECT | LOCAL | DEFAULT | 24 | completed.7281 |
| 31: | 00001ed4 | 0 | OBJECT | LOCAL | DEFAULT | 20 | __do_global_dtors_aux_fin |
| 32: | 000005d0 | 0 | FUNC | LOCAL | DEFAULT | 14 | frame_dummy |
| 33: | 00001ed0 | 0 | OBJECT | LOCAL | DEFAULT | 19 | __frame_dummy_init_array_ |
| 34: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | main.c |
| 35: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | crtstuff.c |
| 36: | 000007c4 | 0 | OBJECT | LOCAL | DEFAULT | 18 | __FRAME_END__ |
| 37: | 00000000 | 0 | FILE | LOCAL | DEFAULT | ABS | |
| 38: | 00001ed4 | 0 | NOTYPE | LOCAL | DEFAULT | 19 | __init_array_end |
| 39: | 00001ed8 | 0 | OBJECT | LOCAL | DEFAULT | 21 | __DYNAMIC |
| 40: | 00001ed0 | 0 | NOTYPE | LOCAL | DEFAULT | 19 | __init_array_start |

p2 (11) Symbol Table .symtab (c)

| | | | | | | | |
|-----|----------|----|--------|--------|---------|-----|----------------------------|
| 41: | 00000690 | 0 | NOTYPE | LOCAL | DEFAULT | 17 | __GNU_EH_FRAME_HDR |
| 42: | 00001fd8 | 0 | OBJECT | LOCAL | DEFAULT | 22 | __GLOBAL_OFFSET_TABLE_ |
| 43: | 00000670 | 2 | FUNC | GLOBAL | DEFAULT | 14 | __libc_csu_fini |
| 44: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __ITM_deregisterTMCloneTab |
| 45: | 000004e0 | 4 | FUNC | GLOBAL | HIDDEN | 14 | __x86.get_pc_thunk.bx |
| 46: | 00002000 | 0 | NOTYPE | WEAK | DEFAULT | 23 | data_start |
| 47: | 00002010 | 0 | NOTYPE | GLOBAL | DEFAULT | 23 | _edata |
| 48: | 00000674 | 0 | FUNC | GLOBAL | DEFAULT | 15 | _fini |
| 49: | 000005d9 | 0 | FUNC | GLOBAL | HIDDEN | 14 | __x86.get_pc_thunk.dx |
| 50: | 00000000 | 0 | FUNC | WEAK | DEFAULT | UND | __cxa_finalize@@GLIBC_2.1 |
| 51: | 00002000 | 0 | NOTYPE | GLOBAL | DEFAULT | 23 | __data_start |
| 52: | 00000000 | 0 | NOTYPE | WEAK | DEFAULT | UND | __gmon_start__ |
| 53: | 00002004 | 0 | OBJECT | GLOBAL | HIDDEN | 23 | __dso_handle |
| 54: | 0000068c | 4 | OBJECT | GLOBAL | DEFAULT | 16 | _IO_stdin_used |
| 55: | 00000000 | 0 | FUNC | GLOBAL | DEFAULT | UND | __libc_start_main@@GLIBC_ |
| 56: | 00000610 | 93 | FUNC | GLOBAL | DEFAULT | 14 | __libc_csu_init |
| 57: | 00002014 | 0 | NOTYPE | GLOBAL | DEFAULT | 24 | _end |
| 58: | 000004a0 | 0 | FUNC | GLOBAL | DEFAULT | 14 | _start |
| 59: | 00000688 | 4 | OBJECT | GLOBAL | DEFAULT | 16 | _fp_hw |
| 60: | 00002008 | 8 | OBJECT | GLOBAL | DEFAULT | 23 | buf |
| 61: | 00002010 | 0 | NOTYPE | GLOBAL | DEFAULT | 24 | __bss_start |
| 62: | 000005dd | 44 | FUNC | GLOBAL | DEFAULT | 14 | main |
| 63: | 00000609 | 0 | FUNC | GLOBAL | HIDDEN | 14 | __x86.get_pc_thunk.ax |
| 64: | 00002010 | 0 | OBJECT | GLOBAL | HIDDEN | 23 | __TMC_END__ |

Histogram for '.gnu.hash' bucket list length (total of 3 buckets):

| Length | Number | % of total | Coverage |
|--------|--------|------------|----------|
| 0 | 0 | (0.0%) | |
| 1 | 1 | (33.3%) | 14.3% |
| 2 | 0 | (0.0%) | 14.3% |
| 3 | 2 | (66.7%) | 100.0% |

Version symbols section '.gnu.version' contains 14 entries:

```
Addr: 0000000000000039c  Offset: 0x00039c  Link: 5 (.dynsym)
000:  0 (*local*)          0 (*local*)          2 (GLIBC_2.1.3)      0 (*local*)
004:  3 (GLIBC_2.0)          0 (*local*)          0 (*local*)          1 (*global*)
008:  1 (*global*)           1 (*global*)          1 (*global*)          1 (*global*)
00c:  1 (*global*)           1 (*global*)          1 (*global*)          1 (*global*)
```

Version needs section '.gnu.version_r' contains 1 entry:

```
Addr: 0x000000000000003b8  Offset: 0x0003b8  Link: 6 (.dynstr)
000000: Version: 1  File: libc.so.6  Cnt: 2
0x0010:  Name: GLIBC_2.0  Flags: none  Version: 3
0x0020:  Name: GLIBC_2.1.3  Flags: none  Version: 2
```

Displaying notes found in: .note.ABI-tag

| Owner | Data size | Description |
|-----------------------|------------|----------------------------------|
| GNU | 0x00000010 | NT_GNU_ABI_TAG (ABI version tag) |
| OS: Linux, ABI: 3.2.0 | | |

